

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re application of :
Morio GAKU et al. :
Serial No. [NEW] : **Attn: Application Branch**
Filed December 28, 2001 : **Attorney Docket No. 2001-1911**

METHOD OF MAKING THROUGH HOLE :
WITH LASER, COPPER-CLAD LAMINATE :
SUITABLE FOR MAKING HOLE, AND :
AUXILIARY MATERIAL FOR MAKING :
HOLE :
(Rule 1.53(b) Divisional of Serial No.
09/271,897, Filed March 18, 1999)

THE COMMISSIONER IS AUTHORIZED
TO CHARGE ANY DEFICIENCY IN THE
FEE FOR THIS PAPER TO DEPOSIT
ACCOUNT NO. 23-0975.

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents,
Washington, DC 20231

Sir:

In the interest of compact prosecution, please amend the present application as follows:

IN THE SPECIFICATION:

Please insert the following paragraph before line 5 on page 1 of the specification:

This is a divisional of Serial No. 09/271,897, filed March 18, 1999.

*Please replace the paragraph beginning at line 14 on page 4 of the specification with
the following rewritten paragraph:*

According to the present invention, there is also provided a method of making penetration holes according to the above, wherein coatings or sheets of an organic substance containing 3 to 97 % by volume of at least one powder selected from the group consisting of a metal compound powder having a melting point of at least 900°C and a bond energy of at least 300 KJ/mol, a

carbon powder and metal powder are formed or disposed on copper foil surfaces of 2 to 10 copper-clad laminates, one coating or sheet on the copper foil surface of one copper-clad laminate, the 2 to 10 copper-clad laminates are stacked, and the upper surface of the stacked copper-clad laminates is irradiated with the carbon dioxide gas laser to form the penetration holes at the same time.

IN THE CLAIMS:

Please cancel claims 1-10 without prejudice to the subject matter thereof.

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R E M A R K S

Upon entry of the above amendment, the claims will be 11 to 20.

The above amendment cancels allowed claims from the parent application and cross-references the parent application and further re-presents an amendment made to page 4 of the specification.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is entitled "**Version with Markings to Show Changes Made**".

Favorable action is now requested.

Respectfully submitted,

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Version with Markings to
Show Changes Made

Title of the Invention

Method of Making Through Hole with Laser, Copper-Clad Laminate Suitable for Making Hole, and Auxiliary Material for Making Hole

5 This is a divisional application of Serial No. 09/271,897, filed March 18, 1999.

Background of the Invention

Field of the Invention

The present invention relates to a method of making a through hole in a copper-clad laminate having at least two copper layers with a carbon dioxide gas laser. More specifically, it relates to a method of making a through hole by directly irradiating a copper-clad laminate surface with the energy of a high-output carbon dioxide gas laser without the pre-removal of a surface copper foil by etching. A printed wiring board to which the above copper-clad laminate having the through hole made above is applied is used mainly for a small-sized semiconductor plastic package.

20 Prior Art of the Invention

In a high-density printed wiring board used for a semiconductor plastic package, etc., a through hole is conventionally made with a drill. In recent years, the through hole diameter is decreasing to 0.15 mm or less, and the diameter of the drill is therefore decreasing. When a hole having the above small diameter is made, the problem is that the drill bents or breaks or that the processing speed is low, due to the small diameter of the drill, which results in problems in productivity and reliability.

30 Further, in a high-density printed wiring board, the width and space of a circuit are sharply decreasing, and in some printed wiring boards, the line/space is 100

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The paragraph beginning at line 14 on page 4 of the specification has been rewritten as follows:

According to the present invention, there is also provided a method of making [penetration] penetration holes according to the above, wherein coatings or sheets of an organic substance containing 3 to 97 % by volume of at least one powder selected from the group consisting of a metal compound powder having a melting point of at least 900°C and a bond energy of at least 300 KJ/mol, a carbon powder and metal powder [which have a melting point of at least 900°C and a bond energy of at least 300 KJ/mol] are formed or disposed on copper foil surfaces of 2 to 10 copper-clad laminates, one coating or sheet on the copper foil surface of one copper-clad laminate, the 2 to 10 copper-clad laminates are stacked, and the upper surface of the stacked copper-clad laminates is irradiated with the carbon dioxide gas laser to form the penetration holes at the same time.